BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

CLAIMS

What is Claimed is:

1. In the manufacturing of microelectronic devices, a method for manufacturing an abrasive slurry for mechanical and chemical-mechanical planarization of substrate assemblies, comprising:

removing a first type of selected abrasive particles from a plurality of first abrasive particles in a first solution to create a treated flow of the first solution;

generating a flow of a second solution having a plurality of second abrasive particles; and

combining the treated flow of the first solution and the flow of the second solution to create a single flow of an abrasive slurry having the first abrasive particles and the second abrasive particles.

2. The method of claim 1 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein removing the first type of selected abrasive particles from the plurality of the first abrasive particles comprises selectively capturing the first type of selected abrasive particles from an untreated flow of the first solution.

3. The method of claim 1 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein removing the first type of selected abrasive particles from the plurality of the first abrasive particles comprises filtering an untreated flow of the first solution through a filter that removes first abrasive particles having particle sizes greater than a maximum desired particle size for the first abrasive particles.

4. The method of claim 3 wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than the maximum desired particle size for the first abrasive particles.

5. The method of claim 4 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles having sizes greater than approximately 0.8 - 1.0 μm.

6. The method of claim 4 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles having sizes greater than approximately 0.3 - 0.4 μm.

7. The method of claim 1 wherein prior to combining the treated flow of the first solution with the flow of the second solution, the method further comprises separating a second type of selected abrasive particles from the second abrasive particles of the second solution to create a treated flow of the second solution, the treated flow of the second solution being combined with the treated flow of the first solution to create the single flow of the abrasive slurry.

8. The method of claim 7 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein separating the second type of selected abrasive particles from the plurality of the second abrasive particles comprises selectively capturing the second type of selected abrasive particles from an untreated flow of the second solution.

9. The method of claim 8 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second

size distribution with a second mean smaller than the first mean of the first size distribution, and wherein separating the second type of selected abrasive particles from the plurality of the second abrasive particles comprises filtering a flow of the second solution through a filter that removes second abrasive particles having particle sizes greater than a maximum desired particle size for the second abrasive particles.

10. The method of claim 9 wherein filtering the second solution comprises passing the second solution through a second filter that removes second abrasive particles from the second solution having particles sizes greater than the maximum desired particle size for the second abrasive particles.

11. The method of claim 10 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than approximately 0.15 - 0.20 μm.

12. The method of claim 10 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than 0.050 μm.

13. The method of claim 1 wherein combining the first solution with the second solution comprising actively agitating the treated first solution and the second solution in a mixing unit.

14. The method of claim 1 wherein combining the first solution with the second solution comprises passing the combined treated first solution and second solution through a turbulent zone of a conduit.

15. The method of claim 1 wherein combining the treated flow of the first and second solutions comprises mixing 1-99% by volume of the first solution with 1-99% by volume of the second solution.

16. The method of claim 15 wherein mixing the first solution comprises altering a mix ratio of the first and second solutions during a single polishing cycle.

17. The method of claim 16 wherein altering the mix ratio comprises changing from a first mix ratio of the first and second solutions to a second mix ratio of the first and second solutions.

18. In the manufacturing of microelectronic devices, a method of making an abrasive slurry for mechanical and chemical-mechanical planarization of substrate assemblies, comprising:

filtering a first solution having a plurality of first abrasive particles;

filtering a second solution having a plurality of second abrasive particles separately from filtering the first solution; and

combining a flow of the filtrated first solution and a separate flow of the filtered second solution into a single abrasive slurry having a first distribution of the first abrasive particles and a second distribution of the second abrasive particles.

19. The method of claim 18 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than a maximum desired particles size for the first abrasive particles.

20. The method of claim 19 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles having sizes greater than approximately 0.8 -1.0 μm.

21. The method of claim 19 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that remove particles having sizes greater than approximately 0.3 - 0.4 μm.

22. The method of claim 19 wherein filtering the second solution comprises passing the second solution through a second filter that removes second abrasive particles from the plurality of second abrasive particles having a size greater than a maximum desired particle size for the second abrasive particles.

23. The method of claim 22 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than approximately 0.15 -0.2 μm.

24. The method of claim 22 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than approximately 0.050 μm.

25. In the manufacturing of microelectronic devices, a method manufacturing a planarizing solution for mechanical and chemical-mechanical planarization of substrate assemblies, comprising:

generating an untreated flow of a first solution having a plurality of first abrasive particles;

creating a flow of a second solution having a plurality of second abrasive particles, the untreated flow of the first solution and the flow of the second solution being separate from one another;

passing the untreated flow of the first solution through a first filter to create a filtered flow of the first solution; and

combining the filtered flow of the first solution and the flow of the second solution into a single abrasive slurry having a first distribution of the first abrasive particles and a second distribution of the second abrasive particles.

26. The method of claim 25 wherein prior to combining the filtered flow of the first solution and the flow of the second solution, the method further comprises passing the flow of the second solution through a second filter to create a filtered flow of the second solution.

27. The method of claim 26 wherein passing the untreated flow of the first solution through a first filter comprises driving the untreated flow of the first solution through a filter that removes particles having sizes greater than approximately 0.8 - 1.0 μm.

28. The method of claim 26 wherein passing the untreated flow of the first solution through a first filter comprises driving the untreated flow of the first solution through a filter that removes particles having sizes greater than approximately 0.3 - 0.4 μm.

29. The method of claim 26 wherein passing the flow of the second solution through a second filter comprises driving the flow of the second solution through a filter that removes particles having sizes greater than approximately 0.15 - 0.2 μm.

30. The method of claim 26 wherein passing the flow of the second solution through a second filter comprises driving the flow of the second solution through a filter that removes particles having sizes greater than approximately 0.050 μm.

31. In the manufacturing of microelectronic devices, a method of planarizing microelectronic-device substrate assemblies, comprising:

fabricating an abrasive slurry by filtering a first solution having a plurality of first abrasive particles to create a filtered flow of the first solution, generating a flow of a second solution having a plurality of second abrasive particles separately from filtering the first solution, and combining the filtered flow of the first solution and the flow of the second solution into a single abrasive slurry having a first distribution of the first abrasive particles and a second distribution of the second abrasive particles;

dispensing the abrasive slurry onto a planarizing surface of a polishing pad; and

removing material from a substrate assembly by pressing the substrate assembly against the planarizing surface and moving at least one of the substrate assembly and the polishing pad with respect to the other to translate the substrate assembly across the planarizing surface.

32. The method of claim 31 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than a maximum desired particles size for the first abrasive particles.

33. The method of claim 32 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles having sizes greater than approximately 0.8 - 1.0 μm.

34. The method of claim 32 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles having sizes greater than approximately 0.3 - 0.4 μm.

35. The method of claim 32, further comprising filtering the second solution by passing the second solution through a second filter that removes second abrasive particles from the plurality of second abrasive particles having a size greater than a maximum desired particle size for the second abrasive particles.

36. The method of claim 35 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than approximately 0.15 - 0.20 μm.

37. The method of claim 35 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles having sizes greater than approximately 0.050 μm.

38. In the manufacturing of microelectronic devices, a method of planarizing microelectronic-device substrate assemblies, comprising:

fabricating an abrasive slurry by removing a first type of selected abrasive particles from a plurality of first abrasive particles in a first solution to create a treated flow of the first solution, generating a second flow of a second solution having a plurality of second abrasive particles, and combining the treated flow of the first solution and the flow of the second solution to create a single flow of an abrasive slurry having the first abrasive particles and the second abrasive particles;

dispensing the abrasive slurry onto a planarizing surface of a polishing pad; and

removing material from a substrate assembly by pressing the substrate assembly against the planarizing surface and moving at least one of the substrate

assembly and the polishing pad with respect to the other to translate the substrate assembly across the planarizing surface.

39. The method of claim 38 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein removing the first type of selected abrasive particles from the plurality of the first abrasive particles comprises selectively capturing the first type of selected abrasive particles from an untreated flow of the first solution.

40. The method of claim 38 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein removing the first type of selected abrasive particles from the plurality of the first abrasive particles comprises filtering an untreated flow of the first solution through a filter that removes first abrasive particles having particle sizes greater than a maximum desired particle size for the first abrasive particles.

41. The method of claim 40 wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than the maximum desired particle size for the first abrasive particles.

42. The method of claim 41 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.8 - 1.0 μm.

43. The method of claim 41 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.3 - 0.4 μm.

44. The method of claim 38 wherein prior to combining the treated flow of the first solution with the flow of the second solution, the method further comprises separating a second type of selected abrasive particles from the second abrasive particles of the second solution to create a treated flow of the second solution, the treated flow of the second solution being combined with the treated flow of the first solution to create the single flow of the abrasive slurry.

45. The method of claim 44 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein separating the second type of selected abrasive particles from the plurality of the second abrasive particles comprises selectively capturing the second type of selected abrasive particles from an untreated flow of the second solution.

46. The method of claim 45 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein separating the second type of selected abrasive particles from the plurality of the second abrasive particles comprises filtering a flow of the second solution through a filter that removes second particles having particle sizes greater than a maximum desired particle size for the second abrasive particles.

47. The method of claim 46 wherein filtering the second solution comprises passing the second solution through a second filter that removes second abrasive particles from the second solution having particles sizes greater than the maximum desired particle size for the second abrasive particles.

48. The method of claim 47 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles sizes greater than approximately 0.15 - 0.20 μm.

49. The method of claim 47 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles sizes greater than approximately 0.050 μm.

50. In the manufacturing of microelectronic devices, a method planarizing microelectronic-device substrate assemblies, comprising:

mixing an abrasive slurry by generating an untreated flow of a first solution having a plurality of first abrasive particles, creating an untreated flow of a second solution having a plurality of second abrasive particles, passing the untreated flow of the first solution through a first filter to create a filtered flow of the first solution, driving the untreated flow of the second solution through a second filter to create a filtered flow of the second solution, and combining the filtered flow of the first solution and the filtered flow of the second solution into a single abrasive slurry having a first distribution of the first abrasive particles about a first mode and a second distribution of the second abrasive particles about a second mode;

dispensing the abrasive slurry onto a planarizing surface of a polishing pad; and

removing material from a substrate assembly by pressing the substrate assembly against the planarizing surface and moving at least one of the substrate assembly and the polishing pad with respect to the other to translate the substrate assembly across the planarizing surface.

51. In the manufacturing of microelectronic devices, an abrasive slurry for planarization of microelectronic-device substrate assemblies made according to a method comprising the acts of:

filtering a first solution having a plurality of first abrasive particles;

filtering a second solution having a plurality of second abrasive particles separately from filtering the first solution; and

combining a flow of the filtrated first solution and a separate flow of the filtered second solution into a single abrasive slurry having a first distribution of the first abrasive particles and a second distribution of the second abrasive particles.

52. The slurry of claim 48 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than a maximum desired particles size for the first abrasive particles.

53. The slurry of claim 52 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.8 - 1.0 μm.

54. The slurry of claim 52 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.3 - 0.4 μm.

55. The slurry of claim 52 wherein filtering the second solution comprises passing the second solution through a second filter that removes second abrasive particles from the plurality of second abrasive particles having a size greater than a maximum desired particle size for the second abrasive particles.

56. The slurry of claim 55 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles sizes greater than approximately 0.15 - 0.20 μm.

57. The slurry of claim 55 wherein passing the second solution through a second filter comprises driving a flow of the second solution through a filter that removes particles sizes greater than approximately 0.050 μm.

58. In the manufacturing of microelectronic devices, an abrasive slurry for planarization of microelectronic-device substrate assemblies made according to a method comprising the acts of:

removing a first type of selected abrasive particles from a plurality of first abrasive particles in a first solution to create a treated flow of the first solution;

generating a flow of a second solution having a plurality of second abrasive particles; and

combining the treated flow of the first solution and the flow of the second solution to create a single flow of an abrasive slurry having a first distribution of the first abrasive particles and a second distribution of the second abrasive particles.

59. The slurry of claim 58 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein removing the first type of selected abrasive particles from the plurality of the first abrasive particles comprises filtering an untreated flow of the first solution through a filter that removes first abrasive particles having particle sizes greater than a maximum desired particle size for the first abrasive particles.

60. The slurry of claim 59 wherein filtering the first solution comprises passing the first solution through a first filter that removes first abrasive particles from the first solution having particles sizes greater than the maximum desired particle size for the first abrasive particles.

61. The slurry of claim 60 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.8 - 1.0 μm.

62. The slurry of claim 60 wherein passing the first solution through a first filter comprises driving a flow of the first solution through a filter that removes particles sizes greater than approximately 0.3 - 0.4 μm.

63. The slurry of claim 58 wherein prior to combining the treated flow of the first solution with the flow of the second solution, the method for making the slurry further comprises separating a second type of selected abrasive particles from the second abrasive particles of the second solution to create a treated flow of the second solution, the treated flow of the second solution being combined with the treated flow of the first solution to create the single flow of the abrasive slurry.

64. The slurry of claim 63 wherein the first abrasive particles have a first size distribution with a first mean and the second abrasive particles have a second size distribution with a second mean smaller than the first mean of the first size distribution, and wherein separating the second type of selected abrasive particles from the plurality of the second abrasive particles comprises selectively capturing the second type of selected abrasive particles from an untreated flow of the second solution.

65. A system for manufacturing a planarizing slurry used in planarization of microelectronic-device substrate assemblies, comprising:

a first feed line for containing a flow of a first solution having a plurality of first abrasive particles;

a second feed line for containing a separate flow of a second solution having a plurality of second abrasive particles, the first abrasive particles being different than the second abrasive particles;

a first removal unit coupled to the first feed line to selectively remove a first type of selected abrasive particles from the first abrasive particles; and

a combination feed line operatively coupled to the first removal unit and the second feed line for containing a combined flow of the first and second solutions after removing the first type of selected abrasive particles from the first solution.

66. The system of claim 65 wherein the first removal unit comprises a first filtration unit.

67. The system of claim 66 wherein the first filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 0.3 - 1.0 μm.

68. The system of claim 65, further comprising a second removal unit coupled to the second feed line to selectively remove a second type of selected abrasive particles from the second abrasive particles, and wherein the combination feed line is coupled to the second removal unit to contain a combined flow of the first and second solutions after removing the first and second types of selected abrasive particles from the first and second solutions.

69. The system of claim 68 wherein:

the first filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 0.4 μm; and

the second filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 0.050 μm.

70. A planarizing apparatus for planarization of microelectronic-device substrate assemblies, comprising:

a table for carrying a polishing pad;

a carrier assembly having a carrier head configured to hold a substrate assembly, the carrier head being movable to press the substrate assembly against the polishing pad, and at least one of the carrier head or the table being translatable with respect to the other to translate the substrate assembly across the polishing pad;

a slurry manufacturing assembly including a first feed line for containing a flow of a first solution having a plurality of first abrasive particles, a second feed line for containing a separate flow of a second solution having a plurality of second abrasive particles, a first removal unit coupled to the first feed line to selectively remove a first type of selected abrasive particles from the first abrasive particles, and a combination feed line operatively coupled to the first removal unit and the second feed line for containing a combined flow of the first and second solutions after removing the first type of selected abrasive particles from the first solution; and

a slurry dispenser coupled to the combination line to dispense the abrasive slurry, the dispenser being positionable over the table to dispense the slurry from the combination line onto the planarizing pad.

71. The planarizing apparatus of claim 70 wherein the first removal unit comprises a first filtration unit.

72. The planarizing apparatus of claim 71 wherein the first filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 1.0 μm.

73. The system of claim 70, further comprising a second removal unit coupled to the second feed line to selectively remove a second type of selected abrasive particles from the second abrasive particles, and wherein the combination feed line is coupled to the second removal unit to contain a combined flow of the first and second solutions after removing the first and second types of selected abrasive particles from the first and second solutions.

74. The planarizing apparatus of claim 73 wherein:

the first filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 1.0 μm; and

the second filtration unit comprises a filter that removes abrasive particles having a particles size greater than approximately 0.2 μm.